

Prediction of US election with linear model*

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This paper forecast the winner of the upcoming US presidential election using “poll-of-polls” by building a linear model.

1 Introduction

Election result forecasting has become an essential tool for analysts in political science and the public to predict the outcome of democratic process, such as the presidential election in the United States. Traditionally, individual polls have been used as a snapshot of voter sentiment, but they only reflect temporary changes in the performance of contestants, instead of a precise estimation of the election result. As discussed by Pasek (2015) and Blumenthal (2014), the aggregation of multiple polls, or “poll-of-polls,” has become a popular technique to reduce individual survey errors and provide more accurate election forecasts. However, the traditional poll aggregation does not reflect dynamics of an election, especially with real-time changes and the introduction of new data. This creates a gap for a more adaptable model to predict the election result based on both polling data and additional variables, such as historical data and economic indicators.

This paper fills the gap by building a hybrid election forecasting model following the strategies mentioned by Pasek (2015). As Pasek (2015) described in their article, aggregation involves determining which surveys are worth including, as well as selecting, combining and averaging results from multiple polls to reduce individual biases and errors. Prediction modeling adds other data to the model that predicts election outcomes based on current dynamics. Hybrid models like the Bayesian approach incorporates prior beliefs based on historical data or expert knowledge and new evidence like economic updates to dynamically adjust the forecast as the campaign progresses. We incorporate aggregation by filtering the polls on FiveThirtyEight (2024) by numeric grade that indicates pollster’s reliability, prediction that incorporates social

*Code and data are available at: <https://github.com/yulexun/uselection>.

and economic indicators including unemployment rates and abortion rates, and hybrid approaches that leverages Bayesian techniques which combines historical data such as the 2016 election data, allowing for a dynamic prediction of the U.S. presidential election.

The estimand for this research paper is the predicted support percentages for Kamala Harris and Donald Trump. The prediction is based on quantifying various polling factors, including sample size, poll scores, and transparency scores, which are used as predictors.

The results of this model indicate a more stable and accurate forecast compared to traditional aggregation methods alone, [update this ...]

The remainder of this paper is structured as follows: [update this ...]

2 Data

2.1 Overview

We use the statistical programming language R (R Core Team 2023).... Our data (**shelter?**).... Following (**tellingstories?**), we consider...

Overview text

2.2 Measurement

Some paragraphs about how we go from a phenomena in the world to an entry in the dataset.

2.3 Outcome variables

Add graphs, tables and text. Use sub-sub-headings for each outcome variable or update the subheading to be singular.

Some of our data is of penguins (Figure 1), from (**palmerpenguins?**).

Talk more about it.

And also planes (**?@fig-planes**). (You can change the height and width, but don't worry about doing that until you have finished every other aspect of the paper - Quarto will try to make it look nice and the defaults usually work well once you have enough text.)

Talk way more about it.

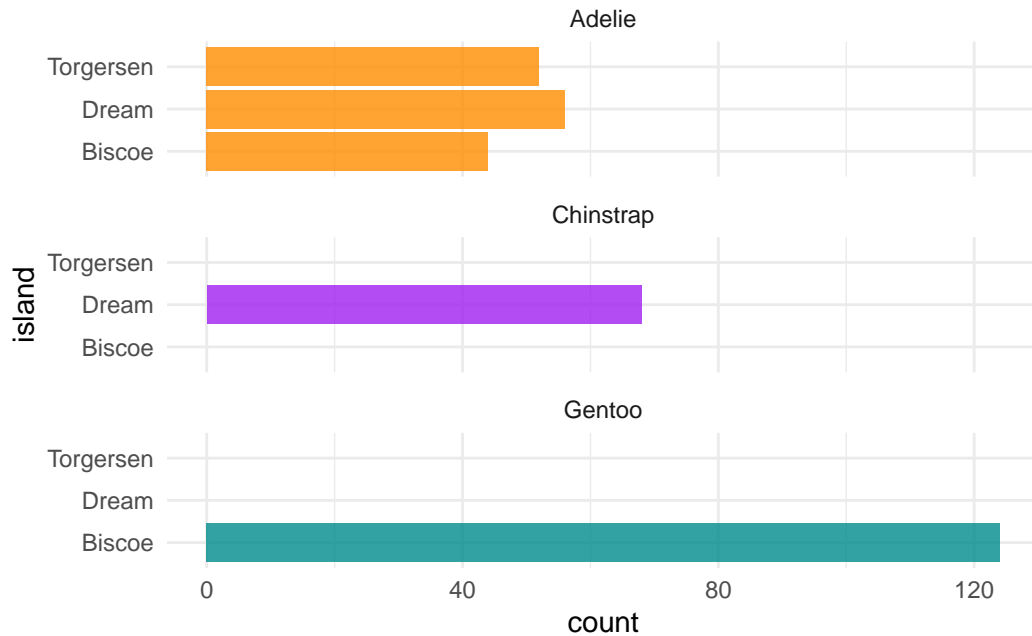


Figure 1: Bills of penguins

2.4 Predictor variables

Add graphs, tables and text.

Use sub-sub-headings for each outcome variable and feel free to combine a few into one if they go together naturally.

3 Model

The goal of our modelling strategy is twofold. Firstly,...

Here we briefly describe the Bayesian analysis model used to investigate... Background details and diagnostics are included in [Appendix B](#).

3.1 Model set-up

Define y_i as the number of seconds that the plane remained aloft. Then β_i is the wing width and γ_i is the wing length, both measured in millimeters.

$$y_i | \mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \quad (1)$$

$$\mu_i = \alpha + \beta_i + \gamma_i \quad (2)$$

$$\alpha \sim \text{Normal}(0, 2.5) \quad (3)$$

$$\beta \sim \text{Normal}(0, 2.5) \quad (4)$$

$$\gamma \sim \text{Normal}(0, 2.5) \quad (5)$$

$$\sigma \sim \text{Exponential}(1) \quad (6)$$

We run the model in R (R Core Team 2023) using the `rstanarm` package of (`rstanarm?`). We use the default priors from `rstanarm`. us

3.1.1 Model justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular...

We can use maths by including latex between dollar signs, for instance θ .

4 Results

Our results are summarized in `?@tbl-modelresults`.

5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Second discussion point

Please don't use these as sub-heading labels - change them to be what your point actually is.

5.3 Third discussion point

5.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

Appendix

A Additional data details

B Model details

B.1 Posterior predictive check

In `?@fig-ppcheckandposteriorvsprior-1` we implement a posterior predictive check. This shows...

In `?@fig-ppcheckandposteriorvsprior-2` we compare the posterior with the prior. This shows...

B.2 Diagnostics

`?@fig-stanareyouokay-1` is a trace plot. It shows... This suggests...

`?@fig-stanareyouokay-2` is a Rhat plot. It shows... This suggests...

C FiftyEight Licenses

FiftyEight's data sets are used and modified by us under the [Creative Commons Attribution 4.0 International License](#).

References

- Blumenthal, Mark. 2014. “Polls, Forecasts, and Aggregators.” *PS: Political Science and Politics* 47 (2): 297–300. <http://www.jstor.org/stable/43284537>.
- FiveThirtyEight. 2024. “Our Data.” *FiveThirtyEight*. <https://data.fivethirtyeight.com>.
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